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POPULATION CHARACTERISTICS OF HUMPBACK WHALES  
(*Megaptera novaeangliae*)  
IN GLACIER BAY AND ADJACENT WATERS  
1990

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## ABSTRACT

Fifty humpback whales including 6 calves were photo-identified in the Glacier Bay-Icy Strait area between 19 May to 31 August 1990. Of this total, 26 (52%) were sighted in Glacier Bay and 34 (68%) in Icy Strait. Ten whales were sighted in both areas. Ten whales were present in Glacier Bay for 20 or more days. This was comparable to 1986-89 when 9 to 12 whales were present in Glacier Bay for a similar length of time. The average length of stay for whales that were present over 20 days was 40 days for whales sighted only in Glacier Bay and 80 days for whales seen only in Icy Strait or seen in both areas. The seasonal influx of whales into Glacier Bay occurred in mid- to late June with a peak in early July. Whale numbers declined through late July and August. The number of whales in Icy Strait remained constant throughout the monitoring season. These use patterns were similar to past years. Primary prey appeared to be schooling fish. Capelin (*Mallotus villosus*) were documented in lower Glacier Bay and herring (*Clupea harengus*) were seen in Icy Strait. Point Adolphus, in Icy Strait, continues to be a focus for whalewatching by private and commercial vessels. One case of harassment was well documented this year, and one adult whale was disentangled from commercial fishing gear.

## INTRODUCTION

North Pacific humpback whales (*Megaptera novaeangliae*) are seasonal migrants, feeding on zooplankton and small schooling fish in the cool, subarctic waters of Alaska and breeding in the warmer, subtropical waters of Hawaii or Mexico. Within Alaska during the feeding season, humpback whales are divided into two distinct known feeding aggregations; one in Prince William Sound and the other in southeastern Alaska, which includes Glacier Bay (Baker, Herman, Perry, Lawton, Straley, Wolman, Winn, Hall, Kaufman, Reinke and Ostman 1986).

Prior to 1978, as many as 24 humpback whales entered Glacier Bay to feed for most of the summer. In 1978 most of the whales that arrived in Glacier Bay departed soon after entry. Two hypotheses were suggested as to the cause of this departure. The first theorized that vessel traffic disturbed the behavior of the whales and the increase in traffic, during the years prior to and including 1978, caused the whales to abruptly depart Glacier Bay. The second hypothesis attributed the departure to a natural decline or shift in prey availability.

In 1981, the National Park Service, with the assistance of the National Marine Fisheries Service, Seattle, Washington, initiated a multi-disciplinary study on the behavior, prey availability and acoustic environment of the humpback whale in Glacier Bay and southeastern Alaska (Baker et al. 1982; Malme, Miles and McElroy 1982; Baker et al. 1983; Miles and Malme 1983; Wing and Krieger 1983; Baker 1984; Krieger and Wing 1984; 1986).

The result of this study did not conclusively demonstrate the reason for the sudden departure of whales from Glacier Bay. There is evidence, however, that a shift in prey distribution may have occurred and that there is short-term temporary disturbance when vessels pass within 0.25 mi (0.4 km) of humpback whales. Given the absence of prey-related data prior to 1978 and the difficulty of assessing the threshold of vessel activity that could cause abandonment of foraging habitat, the exact cause of the 1978 departure may never be resolved. This study aids in the further understanding of the biology and natural history of the humpback whale in Alaskan waters (Baker et al. 1985; Perry et al. 1985; Baker et al. 1986; Baker et al. 1987). Continued long-term studies will be of great value to the management of this endangered species throughout their migratory range. This report summarizes the results of the annual monitoring of humpback whales in Glacier Bay and Icy Strait waters during the late spring and summer.

## METHODS

### Study Area

The study area consisted of the waters of Glacier Bay and the adjacent waters of Icy Strait (Figure 1). Icy Strait is the northern entrance to the inside waters of southeastern Alaska. Glacier Bay is an extensive, recently deglaciated, fjord system branching off the northern shore of Icy Strait.

### Vessel Surveys

Humpback whales were observed and photographed from a 17' Boston Whaler skiff, OGIVE, powered by a 50hp Evinrude outboard motor. Surveys were conducted in Glacier Bay and Icy Strait (Figure 1) from 19 May to 31 August 1990. Glacier Bay was surveyed two or three days per week. Survey routes ranged from the entrance to Glacier Bay to Russell Island. Surveys in Icy Strait occurred once or twice per week, and extended from the Porpoise Islands to Dundas Bay along the north shore and from the entrance to Port Frederick to Idaho Inlet along the south shore. Most survey effort in Icy Strait, however, concentrated near Point Adolphus, as more whales were consistently found there.

Glacier Bay survey routes were determined from whale sightings reported to the National Park Service Visitor Information Station located at Bartlett Cove. If no whales were reported, a systematic route schedule was followed. Glacier Bay was divided into three areas; the lower bay, mid-bay and upper bay. The lower bay consisted of the entrance to Glacier Bay to Sitakaday Narrows. Mid-bay extended from Sitakaday Narrows to Geikie Inlet, along the west shore, and Sturgess Island, along the east shore. The upper bay consisted of the northern mid-bay boundary to Russell Island. Each of these areas was surveyed once a week. Surveys were not conducted in the same area on consecutive days so as to minimize potential impact monitoring efforts may have upon the whales.

A negative or cumulative effect of vessel interactions with whales may exist and the NPS is careful in avoiding or limiting this situation with visitor and park vessels alike. In an area where whales were present and photographs were not obtained, survey effort was repeated on consecutive days. If whales were encountered and not photographed it was primarily due to non-fluking behavior; secondary cause was due to rough seas; and a third cause was the close approach of another vessel, usually a pleasure or charter boat, which interrupted the encounter.

If more than one pod was encountered a quick observation of the estimated number of whales and pods was done from a distance. Then the pods were approached one by one beginning from the closest pod and working towards the distant pods. While

approaching one pod, the other pods were monitored as to their position and movements. NPS protocol limits an individual whale from being approached longer than one hour per day.

Data were recorded on loose-leaf waterproof paper. Each day on the top of the paper the date was written along with the film code, roll number, weather and sea conditions. Next, other observers and any reported whale sightings were noted. The time of departure from Bartlett Cove was written on the left side of the page and subsequent noteworthy times, such as stop times and pod encounters, were also kept on the far left. Begin and end times of pod encounters were recorded. Pods were kept separate by a daily numbering system. The first pod encountered was Pod 1 and so forth. Pod composition was noted and each whale in the pod was given an alphabetical letter (A, B, C etc.) A quick fluke and/or dorsal fin sketch was done for each whale. Film codes were recorded along the left side of the paper and placed in parentheses. At the end of the survey the return time was recorded and a preliminary tally of the number of whales encountered and photographed was noted.

Survey days where whales were encountered and photographed are listed chronologically in Appendix I.

#### Photo-identification

Photographs were taken with a Nikon 8008 camera equipped with a motordrive and a 300mm or 70-210mm zoom lens. High speed (400 pushed to 800 or 1600 ISO) black and white film was used to obtain photographs of the ventral fluke surface of each whale. Whales were approached cautiously from behind and from a distance of 400m, at a slow consistent speed. Photographs were taken 10-30m directly behind the whale. Each whale fluke has a distinctive black and white pigment pattern that allows for individual identification (Katona, Baxter, Brazier, Kraus, Perkins and Whitehead 1979). A dorsal fin photograph was taken if a fluke photograph was not possible. This required a close, 8-15m, parallel approach of the left or right side of the whale. The photograph was taken directly alongside while moving parallel with the whale. An attempt was made to photograph both side of the whale, if only one side was available the left was preferred. Film was processed and printed by Panda Photographic Laboratories, Inc., Seattle, Washington.

Contact sheets were used for preliminary data analysis. The contact sheet was compared and labelled with the filmcode data. The best photograph of each fluke was selected for annual printing and cataloging.

Individual identification photographs were compared to previous photographs of Glacier Bay and Icy Strait whales to determine the sighting history of each whale. Each matched whale was referred

to by identification number issued by Glacier Bay National Park (GBNP) or the Kewalo Basin Marine Mammal Laboratory (KBMML) catalog (Perry et al. 1988) of North Pacific humpback whales. GBNP identification numbers are greater than 1011 and were issued to whales resighted since publication of the KBMML catalog. Previously unidentified and unmatched whales in Glacier Bay and Icy Strait were assigned a temporary identification code, such as AIS90-01 or AGB90-01. This code refers to where the animal was first sighted, Icy Strait (AIS) or Glacier Bay (AGB), the year (90) and the sighting sequence (01, 02, etc.). Permanent identification numbers may be assigned at a later date pending further analysis and resighting. Whales first photo-identified by Jurasz and Palmer (1981a; 1981b) were also listed by their nicknames.

Calves were defined as whales less than one year old. They were determined from their size (4-10m) and their close, consistent affiliation with the same adult whale, considered to be the mother or cow. Juveniles were defined as a whale five years old or less with age verified through previous documentation of the birth year. Known age adults were defined as a whale over five years of age.

#### Prey Assessment

In 1990, qualitative assessment of prey was determined visually, through sampling of gut contents of salmon and halibut caught in areas where whales were actively feeding and by using a chart recording echosounder (Ross fine line recorder 250c). Whale prey data are summarized in a separate NPS report. In previous years, quantitative hydroacoustic assessment of prey was conducted by National Marine Fisheries Service, Auke Bay Laboratory, Juneau, Alaska (Wing and Krieger 1983; Krieger and Wing 1984; 1986).

#### Vessel Interactions and Entanglements

Vessel interaction observations and entanglements occurred opportunistically during normal survey efforts in Glacier Bay and Icy Strait or were reported to the NPS Visitor Information Station at Bartlett Cove. All reports of entanglements were investigated by NPS personnel.

## **RESULTS**

#### Survey Effort

Glacier Bay surveys were conducted on 6 days in May, 16 days in June, 18 days in July and 14 days in August (Table 1). Icy Strait surveys were conducted on 4 days in May, 5 days in June, 6 days in July and 8 days in August. Surveys occurred both in Icy Strait and Glacier Bay on 11 days. These compare favorably with

previous years (Table 1).

Table 1. Number of survey days for humpback whales in Glacier Bay and Icy Strait, 1985-90.

YEAR	<u>GLACIER BAY</u>					<u>ICY STRAIT</u>				
	MONTH									
	MAY	JUNE	JULY	AUG	SEPT	MAY	JUNE	JULY	AUG	SEPT
1990	6	16	18	14	0	4	5	6	8	0
1989	3	17	14	16	1	1	6	6	7	4
1988	0	11	12	12	7	0	5	7	5	3
1987	3	12	12	5	1	2	5	7	7	2
1986	0	13	17	6	0	0	5	3	6	2
1985	0	10	11	10	0	0	7	4	3	1

Time photographing and searching for humpback whales in Glacier Bay and Icy Strait totaled 330hrs; with 215hrs spent in Glacier Bay and 115hrs in Icy Strait. This survey effort is consistent with 1985, 88 and 89 (Table 2). Search and encounter time for 1986 and 1987 were unavailable. Table 2 also includes a summary of total whale counts for both areas for the years 1985-90. This is helpful in comparing effort with the total number of whales seen in Glacier Bay and Icy Strait for the past six years.

Table 2. Total search and encounter time (hrs) for humpback whales in Glacier Bay (GB) and Icy Strait (IS), 1985 and 1988-90, and total whale counts 1985-90.

YEAR	<u>AREA</u>			TOTAL WHALE COUNT GB & IS
	GB (hrs)	IS (hrs)	TOTAL (hrs)	
1990	215	115	330	50
1989	231	123	354	42
1988	199	108	307	55
1986	-	-	-	59
1987	-	-	-	51
1985	234	92	326	41

### Counts

Fifty individual humpback whales were photo-identified in Glacier Bay and Icy Strait between 19 May and 31 August 1990 (Appendix I). Of this total count, 16 (32%) whales were photo-identified only in Glacier Bay, 24 (48%) only in Icy Strait and 10 (20%) photo-identified in both areas. Therefore 26 (52%) whales were photographed in Glacier Bay and 34 (68%) were photographed in Icy Strait.

Previous studies (Perry et al. 1985, Vequist and Baker 1987) describe a standardized counting period where whales were identified during the first week in July and mid-August (specifically 09 July-16 August) and compared between study years. This standardized count was 16 and 24 whales identified in Glacier Bay and Icy Strait, respectively (Table 3). Four whales were photo-identified in both areas during this time.

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Table 3. Standardized and total counts of humpback whales identified in Glacier Bay and Icy Strait, 1982-1990.

		Counts of Humpback Whales								
		1982	1983	1984	1985	1986	1987	1988	1989	1990
Glacier Bay										
standardized		22	10	24	10	26	28	17	20	16
total		22	10	25	15	32	33	39	24	26
Icy Strait										
standardized		5	9	21	19	27	34	29	19	24
total		15	9	22	30	35	48	36	30	34
Combined										
standardized		33	17	39	27	42	49	41	33	36
total		33	17	39	41	51	59	55	42	50

Note: Total counts refer to the number of whales sighted during the entire monitoring season. Standardized counts refer to the number of whales photo-identified during early July and mid-August each year.

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### Birth Rates and Juvenile Survival

There were six calves identified in the Glacier Bay and Icy Strait area during 1990 (Appendix I). This resulted in a crude birth rate (defined as calves/total count) of 12.0%. Two calves were seen in Glacier Bay and four in Icy Strait. Birth rates between 1982 and 1990 ranged from 0-18.2% (Table 4) (Baker 1985a; Perry et al. 1985; Baker 1986; Baker 1987; Baker and



Straley 1988; Straley 1989).

Table 4. Total whale counts, number of calves and crude birth rates for humpback whales in the Glacier Bay and Icy Strait area, 1982-1990.

Year	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total count	33	17	39	41	51	59	55	42	50
Calves	6	0	7	2	8	4	8	5	6
Birth rate %	18.2	0.0	17.9	4.5	15.7	6.8	14.5	11.9	12.0

Calves photo-identified in previous years have returned in subsequent years. Two young adults (#353 and #352), sighted as calves in 1984, have returned to the Glacier Bay and Icy Strait area since 1987 (they were not seen in 1985 and 1986). Their mothers (#581 and #530, respectively) also continue to return to the area. Two older adults, #186 and #516, have also returned to this area since first identified as calves. Animal #186, the calf of #530 in 1982, has returned every year and #516 (Garfunkle) has returned in 11 out of 16 years since first identified as a calf in 1974. Another juvenile may have returned this year. Whale AIS90-9 is a potential match with #1042, photo-identified as a calf of #581 in 1987. The 1990 photograph was taken at an angle and is of insufficient quality for positive confirmation of the match. These two (#1042 and AIS90-9) photographs were sent to the National Marine Mammal Laboratory for additional consultation. The resulting conclusion was that a third photograph, currently not available, would aid in determination of a match. The continued return of these whales, as juveniles and adults, continues to document maternally-directed fidelity to the Glacier Bay and Icy Strait area.

Fluke identification photographs were taken for all the calves seen in Glacier Bay and Icy Strait. All the cows were fluke photo-identified with the exception of AGB90-7, seen in Glacier Bay. She was only photo-identified by a dorsal fin photograph.

#### Seasonal Distribution

**Glacier Bay**-In late May, two whales were photo-identified in Glacier Bay, one in Sitakaday Narrows and one north of Pt. Carolus. Whales were also observed in Bartlett Cove and reported near Tidal Inlet and in Beardslee Entrance in May. During June, survey counts ranged between 1 and 3 whales, with 10 different

whales identified for the month. Whales were observed near Tidal Inlet, Scidmore Bay, Hugh Miller Inlet, Geikie Inlet, Sitakaday Narrows, Beardslee Entrance and Bartlett Cove. In late June, Whidbey Passage, including Fingers Bay, became a consistent feeding area.

Peak daily survey count for Glacier Bay occurred on 7 July when 9 whales were photo-identified. Whales were seen in the same areas during June with two exceptions. On 25 July researchers Lewis and Lynne Hunter observed a single humpback whale near Russell Island in the west arm of Glacier Bay, and on 23 July 2 humpback whales were observed near Riggs Glacier, in Muir Inlet, by a local charter boat operator. Whale numbers declined in late July and throughout August with a similar distribution and numbers as seen during June and late May.

**Icy Strait**-Humpback whales were seen in Icy Strait throughout the monitoring season. Three whales were photographed on 19 May and numbers gradually increased until 11 June when 17 whales were photo-identified. This was the highest number of whales photographed in one day during this season. Numbers stayed high, however, with 10-16 individual whales photographed weekly until surveys ended on 31 August.

Early in the season (late May) whales were spread out across Icy Strait with sightings occurring near Pleasant Island, the mouth of Dundas Bay, Idaho Inlet, Mud Bay and Port Frederick. By early June and during the rest of the monitoring season the majority of whales were utilizing the Pt. Adolphus area.

#### Movement Between Areas and Length of Stay

Ten whales were sighted in both Glacier Bay and Icy Strait (Appendix I). There was frequent exchange (one or more round trips) for 8 whales between Glacier Bay and Icy Strait and 2 whales moved once from Glacier Bay to Icy Strait (Appendix I).

Ten whales were seen for 20 or more days in Glacier Bay (Table 5). Length of stay ranged from 23 to 80 days. The mean length of stay was 43.4 days. This included four whales (#118, #352, #237 and #351) that were sighted also in Icy Strait and six whales sighted only in Glacier Bay (Table 6).

Table 5. Minimum length of stay for whales seen 20+ days in Glacier Bay during the 1990 monitoring season.

Whale ID #	Nickname	First Day Sighted	Last Day Sighted	Days
1. 118	Chop Suey	24 May	11 August	80
2. 1021		28 May	23 June	27

3.	351		6 June	5 July	30
4.	1012		11 June	17 August	68
5.	1046	AGB90-2	12 June	30 July	49
6.	235	Spot	17 June	9 July	23
7.	117	White Eyes	21 June	18 July	28
8.	352		22 June	10 August	50
9.	237	Dike	25 June	27 July	33
10.	159		3 July	17 August	46
					$\bar{x}=43.4$

Twenty-nine (58%, n=50) whales spent 20 or more days in one or both areas (Table 6). The longest documented length of stay was 105 days for whale #352, who was sighted in both areas (Table 6).

Table 6. Comparison of length of stay (20+ days) for whales seen only in Glacier Bay (GB), only in Icy Strait (IS) and in both areas during the 1990 monitoring season.

Whale ID #	GB only (days)	IS only (days)	GB and IS (days)	% of total seen 20+ days
1. 1012	68			
2. 1046	49			
3. 159	46			
4. 117	28			
5. 1021	27			
6. 235	23			37.5%
$\bar{x}=40.2$				
1. 539		94		
2. 530		99		
3. 1054		99		
4. 573		85		
5. 1053		85		
6. 219		85		
7. 1050		85		
8. 166		82		
9. 186		82		
10. 616		75		
11. 353		66		
12. 584		65		
13. 941		41		54.2%
		$\bar{x}=80.2$		
1. 352			105	
2. 157			104	
3. 587			94	
4. 577			94	
5. 118			87	

6.	351	87	
7.	236	82	
8.	516	80	
9.	237	64	
10.	566	25	100.0%
		$\bar{x}=80.2$	

total=29

Every whale sighted in both Glacier Bay and Icy Strait stayed over 20 days, with 80.2 days as the mean length of stay (Table 6). Thirteen (52.2%) of the 24 whales sighted only in Icy Strait stayed over 20 days, with a mean stay of 80.2 days (Table 6). Six (37.5%) of the 16 whales sighted only in Glacier Bay stayed 20+ days, with 40.2 days as mean length of stay (Table 6).

### Prey Assessment and Feeding Behavior

**Glacier Bay**-Similar to past years, whales were solitary or occasionally seen in pairs. They fed close to shore often in small bays or coves. Primary feeding behavior consisted of short, fluke-up dives. In Fingers Bay and Bartlett Cove, dense aggregations of small, schooling fish were observed for most of the monitoring season. On 12 July, in Bartlett Cove, two capelin (*Mallotus villosus*), 10.0cm and 10.5cm in length, were dipnetted off the main dock. Minnow traps were set in Fingers Bay on 8 and 14 August in an attempt to capture previously observed schooling fish. These traps were set overnight with three traps per set; near-bottom, mid-depth and near-surface. This attempt was successful in capturing only a few small shrimp. Salmon and halibut gut samples caught near feeding whales proved unsuccessful in determining target prey. Stomachs contained small shore crabs, partially digested fish of unknown species, or were empty.

Lunge feeding was observed twice. On 3 July, whale #159 was observed lateral lunge feeding in Hugh Miller Inlet and on 23 July #237, Dike, was seen lunge feeding in Whidbey Passage, off Fingers Bay. One humpback whale was reported lunge feeding between the Marble islands on 9 August.

**Icy Strait**-As in previous years, herring (*Clupea harengus*) were visually observed in Icy Strait, with dense schools seen in the Mud Bay to Point Adolphus areas. In early June, local fishing charter boat operators reported herring and sandlance (*Ammodytes hexapterus*) distributed throughout Icy Strait, similar to the whale distribution early in the monitoring season. Net tows and hydroacoustic surveys done in 1983-87 off Point Adolphus has documented the presence of herring (Krieger and Wing 1984; 1986; Baker 1987).

Feeding behavior in Icy Strait was also similar to other years.

A cohesive "core" group (Perry et al. 1985) of 8 to 10 whales at Point Adolphus again dominated the feeding pattern. This year the group consisted of #'s 539, 577, 587, 186, 236, 166, 573 and her calf, and 155 and her calf. Whale #155 and her calf departed Icy Strait in late June but was a member of the group for most of June. These whales have constituted a close affiliation and have been seen feeding together in numerous years (Perry et al. 1985; Baker 1986; 1987; Baker and Straley 1988; Straley 1989). The presence of calves within this group was unusual. In other years when females of this group have had a calf present they did not associate with the core group. An exception occurred in 1988 with #587 and her calf. Additionally, cows with calves have not been seen associating with other cows/calf pairs for an extended period. This year two cow/calf pairs joined the group and associated with each other for nearly a month. This cohesive behavior of the core group continues to document cooperative feeding behavior among humpback whales in Alaskan waters (Baker 1985). Other whales fed in singles, pairs or trios.

#### Vessel Interactions and Entanglements

Point Adolphus continues to be the focus of whalewatching for private and commercial vessels (Baker and Straley 1988; Straley 1989). Guided kayak tours, charter boats, tour boats, cruise ships and pleasure boats were observed whalewatching at Point Adolphus. This year there was a noticeable increase in tour boats whalewatching in Icy Strait. Six different tour boats were observed whalewatching compared with two in 1989. Instances of pursuit for photography, including the use of video cameras at close range, and harassment of these whales were observed. One harassment episode was well documented by NPS and reported to NOAA-Division of Enforcement, Juneau, AK. Francois Gohier, a commercial photographer from California, was observed by NPS employees pursuing and photographing a cow and her calf in Icy Strait. In addition, numerous charter boat operators and kayakers reported this harassment during 1 July to 5 July 1990 to the NPS Visitor Information Center. Appendix II, the letter sent to NOAA, is a detailed account of this incident.

One adult humpback whale was reported entangled in commercial fishing gear near Pleasant Island, in Icy Strait, on 14 August 1990. Two NPS vessels responded to this report and successfully disentangled the whale from most of the gear. The whale's behavior was monitored for nearly an hour after the gear was removed. During this period the whale resumed a normal breathing and diving pattern. The fishing gear consisted of commercial king crab gear, 30 meters of line and two buoys. This is the second case of whale entanglement by commercial fishing gear, during the past three years in Icy Strait. In August 1988, the NPS freed a humpback whale calf entangled long-line bottom fishing gear.

## DISCUSSION

Movements of whales into Glacier Bay and Icy Strait were similar to past years (Perry et al.<sup>1985</sup>; Vequist and Baker 1987; Baker and Straley 1988; Straley 1989). In summary, the influx of whales into Glacier Bay during 1990 occurred in mid- to late June and peaked in early July. There was a slow decline through late July and August. The number of whales in Icy Strait remained constant throughout the monitoring season.

The number of days surveyed in Glacier Bay was slightly higher (Table 1) and search effort was less than last year (Table 2). The likely reason for change in search effort was the difference in whale distribution this year, as more whales were localized in the mid- to lower bay area and were easier to locate. Therefore, less time per survey was spent finding whales in 1990 than in 1989. It can only be speculated why more days were surveyed this year. Last year there was an increase in search effort in Icy Strait/Cross Sound attempting to locate whales possibly displaced from Prince William Sound due to the March 1989 *EXXON VALDEZ* oil spill (Straley 1990). This could have had the effect of reducing survey time in Glacier Bay during 1989. Overall, there has been a slight increase in survey effort during the past two years when compared to previous years (Tables 1 and 2).

The number of whales observed during the standardized counting period in Glacier Bay is the third lowest since systematic monitoring began in 1982 (Table 3). There were fewer whales using Glacier Bay, but about the same number stayed for 20+ days as seen during 1986 to 1989 (Straley 1989). All but one of the whales sighted in Glacier Bay have been seen in previous years. Whale #1046 was a new sighting this year. Even though the number of whales was lower this year, there is still a remarkable consistency in the number of whales that have returned to use the bay over the past five years.

This year, a general trend was documented for individual whales to spend less time in Glacier Bay, when compared to Icy Strait. Whales that were present 20 days or longer and seen in both Glacier Bay and Icy Strait or only Icy Strait stayed twice as long as whales seen only in Glacier Bay (Table 6). It is interesting that all of the whales seen in both Glacier Bay and Icy Strait stayed 20+ days, with most whales moving back and forth between the two areas. The documentation of this frequent exchange continues to support the hypothesis that humpback whales consider this area one continuous habitat.

The unregulated whalewatching that has occurred over the years at Point Adolphus continues to be a source of undocumented harassment on these whales. The dramatic increase in tour boats is cause for management concern. These large vessels attempt to maneuver around the whales similar to a smaller boat, with a far

greater harassment impact, due to their larger size. This behavior also precludes other boats from viewing the whales by blocking more distant observations and displacing feeding whales. The provisions of the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973 are not adequately protecting these whales from harassment. Long-term disturbance in terms of disruption of feeding behavior or reproductive success is currently unknown. Through continued monitoring of the humpback whale in Glacier Bay and Icy Strait we will continue to add significantly to the natural history and biology of this species in Alaskan waters.

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# APPENDIX I.

## HUMPBACK WHALES GLACIER BAY (G) AND ICY STRAIT (I) 1990

WHALE #	NAME	DATE																		
		MAY					JUNE													
		19	24	25	26	28	30	06	08	09	11	12	17	19	20	21	22	23	25	
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
157	MD	I														G				
118	Chop Suey	I	G	I			I			G	I									
352		I									I						G		G	
581				I	I					I	I									
530				I			I			I	I									
1054	530's calf			I			I			I	I									
237	Dike				I														G	
516	Garfunkle				I															
<del>1021</del>	<del>Garfunkle</del>					G								G				G		
587	Gertrude						I			I	I						I			
577	Scoper						I										I			
539	Max						I			I	I						I			
351								G												
285	AIS90-2									I										
219										I							I			
1050	219's calf									I							I			
<del>945</del>	<del>AIS90-3</del>									I							I			
573										I							I			
1053	573's calf									I							I			
1012											G		G							
236	Leigh										I									
166	Frenchie										I						I			
155											I						I			
1051	155's calf												I					I		
186											I						I			
1046	AGB90-2											G								
235	Spot													G	G	G	G			
<del>1047</del>	<del>AGB90-3</del>													G		G				
<del>1064</del>	<del>AGB90-4</del>																G			
117	White Eyes																			
353																				
941																				
584	AIS90-4																			
616	Lesser				I															
535	Quits																			
1052	535's calf																			
159																				
740	AIS90-5																			
566	Curly Fluke										I									
<del>1063</del>	<del>AGB90-5</del>																			
<del>225</del>	<del>AGB90-6</del>																			
225	AIS90-6																			
232	Notchfin																			
501																				
<del>1048</del>	<del>AGB90-7</del>																			
1049	1048's calf																			
	AIS90-8																			
1018																				
513																				
	AIS90-9																			

# HUMPBACK WHALES GLACIER BAY (G) AND ICY STRAIT (I) 1990

HALE #	NAME	DATE																												
		JUNE						JULY																						
		26	27	28	01	03	04	05	06	07	09	11	15	16	17	18	20	23	25	26										
		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
157	MD		I						I			I																		I
118	Chop Suey									G	G		G	G	G															
352		G	G/I			G		G	G	G																				
581																														
530			I						I			I																		I
1054	530's calf		I						I			I																		I
237	Dike										G			G	G												G	G		
516	Garfunkle	G	I			G					G			G																I
<del>1021</del> 160																														
587	Gertrude		I						I	G		I																		I
577	Scoper		I							G		I				I														I
539	Max		I						I			I																		
351								G																						
285	AIS90-2																													
219									I			I				I														
1050	219's calf								I			I				I														.
<del>045</del> <del>AIS90-3</del>																														
573			I						I			I				I														I
1053	573's calf		I						I			I				I														I
1012						G								G													G			
236	Leigh		I								G	G																		I
166	Frenchie																													I
55			I																											
1051	155's calf		I																											
186			I						I			I				I														I
1046	AGB90-2																													
235	Spot							G			G	G																		
<del>1047</del> 937	AGB90-3																													
<del>1047</del> 937	<del>AGB90-4</del>																													
117	White Eyes	G																										G		
353			I									I				I														I
941												I																		I
584	AIS90-4				I																									
616	Lesser					I										I														
535	Quits						G	G		G		G	G				G	G												
1052	535's calf						G	G		G		G	G				G	G												
159							G		G																					
740	AIS90-5							I																						
566	Curly Fluke								G																					.
<del>1043</del> 1043	<del>AGB90-5</del>											G																		
<del>225</del> 225	<del>AGB90-6</del>																											G		
225	AIS90-6													I																
232	Notchfin																													
501																														
<del>1048</del> 921	AGB90-7																													
1049	1048's calf																													
	AIS90-8																													(ENTANGLED WHALE)
1018																														
13	AIS90-9																													

# HUMPBACK WHALES GLACIER BAY (G) AND ICY STRAIT (I) 1990

WHALE #	NAME	DATE																	
		July			August														
		27	30	31	1	6	7	10	11	13	14	15	17	20	21	30	31		
		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
157	MD						I							I		I			
118	Chop Suey		G		G	G			G		I								
352					G			G										I (visual)	
581																			
530							I		I								I	I	
1054	530's calf						I		I								I	I	
237	Dike	G																	
516	Garfunkle				I		I			I									
1021	1021's calf																		
587	Gertrude				I		I		I					I		I	I		
577	Scoper				I		I		I					I		I	I		
539	Max													I		I	I		
351					I		I					I				I	I		
285	AIS90-2																		
219					I		I							I			I		
1050	219's calf				I		I										I		
1045	<del>AIS90-3</del>																		
573					I		I		I					I			I		
1053	573's calf				I		I		I					I			I		
1012		G		G				G						G					
236	Leigh				I		I		I					I		I	I		
166	Frenchie				I		I		I					I		I	I		
155																			
1051	155's calf																		
186					I		I		I					I		I	I		
1046	AGB90-2		G																
235	Spot																		
	<del>AGB90-3</del>																		
	AGB90-4																		
117	White Eyes																		
353					I							I					I		
941														I					
584	AIS90-4																I		
616	Lesser				I		I												
535	Quits																		
1052	535's calf																		
159		G											G	G					
740	AIS90-5																		
566	Curly Fluke																		
1048	<del>AGB90-5</del>																		
225	<del>AGB90-6</del>																		
232	AIS90-6																		
501	Notchfin		G																
1048	<del>AGB90-7</del>						I		I					I					
1049	1048's calf							G	G							G			
	AIS90-8 DFC															G			
1018																			
513																	I		
	AIS90-9						I												

I (entangled whale)